

INFLUENCE OF THE PROTON CONCENTRATION ON THE PROPERTIES OF THE LiNbO_3 and LiTaO_3 CRYSTALS

Interim report 1

by

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13. ABSTRACT/ In the proposal we wrote one year ago, the work plan for the first year was to compare between as exchanged waveguides and annealed waveguides presenting the same index profiles in order to determine if the proton concentration in a given phase is fixed or depends on the fabrication conditions, extra protons, sometimes called "interstitial protons" being introduced in some cases. We planed to do this on LiTaO ₃ where we knew the phase diagram of the exchanged layers. But today, the phase diagram of the LiNbO ₃ is also known, so this study will be transferred to this crystal, which presents more interest for the application we are presently considering : the realization of an Integrated Optical Parametric Oscillator, but the work plan will be exactly the same.			
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Work plan for the first year

In the proposal we wrote one year ago, the work plan for the first year was the following :
Comparison between as exchanged waveguides and annealed waveguides presenting the same index profiles in order to determine if the proton concentration in a given phase is fixed or depends on the fabrication conditions, extra protons, sometimes called "interstitial protons" being introduced in some cases. This work will first be done on LiTaO_3 where we know the phase diagram of the exchanged layers and covers :

- Planar waveguide fabrication following different recipes

- Index profile measurements

- Rocking curves to determine the crystalline quality and the phase of the exchanged layer

- SIMS measurements to determine the proton concentration profile.

Today, the phase diagram of the LiNbO_3 is also known, so this study will be transferred to this crystal, which presents more interest for the application we are presently considering : the realization of an Integrated Optical Parametric Oscillator, but the work plan will be exactly the same.

We have then started to produce waveguides in all the possible phases (7). Some of this phase are obtainable with different recipes, such as direct exchange or exchange followed by annealing. In order to be able to distinguish between these different possibilities we will prepare similar waveguides using both techniques.

Making the waveguides and doing the optical characterization will last about 3 months. Samples will then be sent to the partners for proton concentration measurements and crystallographic examination.